DOCUMENT RESUME

ED 109 763 88 EA 007 351

AUTHOR Davis, John D., III; Dunklau, M. William
TITLE Faculty Projection Program: General Description and Users Guide. Project SIMU-School: Dallas Component.
INSTITUTION Dallas Independent School District, Tex. Dept. of Research and Evaluation.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
REPORT NO RR-75-617
PUB DATE Feb 75
NOTE 80p.; Related documents are EA 007 350-354

EDRS PRICE MF-$0.76 HC-$4.43 PLUS POSTAGE
DESCRIPTORS Computer Oriented Programs; *Computer Programs; Data Analysis; Educational Administration; Elementary Secondary Education; *Management Systems; *Personnel Needs; *Program Guides; Teacher Characteristics; *Teacher Employment; Teacher Salaries
IDENTIFIERS Elementary Secondary Education Act Title III; ESEA Title III; *Faculty Projection Program; Project SIMU School

ABSTRACT

This booklet describes the Faculty Projection Program, a computer program package developed as part of a family of educational management systems. The program predicts the number and cost of teachers starting, terminating, remaining, and needed each year. Teachers may be grouped by one or more variables such as race, sex, salary group, subject area, or professional status. The program can project teacher requirements for up to nine years into the future. The booklet is organized into two sections--a brief general description and a much more lengthy user's guide providing a detailed explanation of how to use the program. A sample printout for the program is included in the appendix. (Author/JG)

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EA 007 351

PROJECT SIMU-SCHOOL

DALLAS COMPONENT

Dallas Independent School District
3700 Ross Avenue, Dallas, Texas 75204 (214) 824-1620

Dallas Independent School District
Dr. Nolan Estes, General Superintendent

Development Division
Mr. Rogers L. Barton
Associate Superintendent

Department of Research, Evaluation,
and Information Systems
Dr. William J. Webster
Deputy Associate Superintendent

FACULTY PROJECTION PROGRAM: GENERAL DESCRIPTION AND USERS GUIDE

Research Report No. 75-617

John D. Davis III
Senior Analyst

M. William Dunklau
Technical Director

Approved report of the Department of Research,
Evaluation, and Information Systems

John D. Davis III
Senior Analyst
Project Simu-School

Gerald N. King, Ph.D.
Deputy Assistant Superintendent
Planning and Data Processing Services

M. William Dunklau
Technical Director
Project Simu-School

William J. Webster, Ph.D.
Deputy Associate Superintendent
Research, Evaluation, and
Information Systems

February, 1975

EXECUTIVE SUMMARY

Objectives of the Project: The Faculty Projection Program predicts on a year-to-year basis the number and cost of teachers starting, terminating, remaining, and needing to be hired. Teachers may be grouped by one or more variables such as race, sex, salary group, subject area, or professional status. The program moves teachers through the salary schedule and terminates them according to frequencies established by historical data. It determines the number of teachers required from enrollment data and from previous years' curriculum data, and alternatives introduced externally by the user. The program can project teacher requirements for up to nine years into the future.

The program is an independent computer program package and is one of the components in a comprehensive family of programs which includes the Enrollment and Facilities Projection Program and the Financial Projection Program. Separately or as a total set, the aim is to improve educational planning and decision-making at the district level.

The prediction mathematics used in the Faculty Projection Program is a probabilistic process. Using the starting complement of teachers for the current year, the process predicts the status of the group for the next year using transition probabilities calculated from the data base. For example, some teachers will have received advanced degrees and will be paid on a higher pay grade. Some teachers will switch teaching areas. Some will terminate. Most of the remaining teachers will advance one pay step in the salary schedule. The program anticipates these possibilities by calculating transition probabilities for each possible event.

These transition probabilities are organized into rows, and the rows into what is called a transition probability matrix. By performing a multiplication of the starting teacher complement times the transition probability matrix, the program predicts the status of the group one year later, including the number and status of teachers who will remain and the number of teachers who will terminate at the end of the current school year.

The program predicts next year's starting complement of teachers by using the remaining teachers from the current year and by hiring new teachers as needed. If enrollment and distribution of subjects taken remain similar from one year to the next, terminating teachers will tend to be replaced in the hiring process. If enrollment or distribution of subjects taken or other factors change, the hiring process will reflect the change.

A new starting complement of teachers is calculated from the remaining and newly hired teachers. With the new starting complement, the entire process is repeated in order to project teacher requirements for the following year, and so on, for up to nine years of projections.

FACULTY PROJECTION PROGRAM

GENERAL DESCRIPTION

Synopsis

The Faculty Projection Program predicts on a year-to-year basis the number and cost of teachers within an LEA. The program was created in response to a need -- the need for means by which school administrators could quantitatively plan for expenditures which constitute approximately 75% of their operating budget -- personnel costs. The program provides a means of integrating at one time many factors which affect faculty flow within a school district.

The program predicts the number and cost of teachers starting, terminating, remaining, and, needing to be hired for each year. Teachers may be grouped by one or more variables such as race, sex, salary group, subject area, or professional status. The program moves teachers through the salary schedule and terminates them according to frequencies established by historical data. It determines the number of teachers required from enrollment data and from previous years' curriculum data, and alternatives introduced externally by the user. The program can project teacher requirements for up to nine years into the future.

The Faculty Projection Program is written in FORTRAN IV and was originally implemented on a Burroughs B-5500 computer. Memory requirements in a non-virtual storage environment are approximately 500,000 bytes. Peripheral equipment requirements are a disk, two tape drives, a card reader, and line printer. Special arrangements can be made in order to implement the program in computer environments where less than 500,000 bytes of memory are available. Computer systems having less than 500,000 bytes of memory but with virtual storage available can implement the program directly.

Input Requirements

The input requirements for the Faculty Projection Program can be decribed as being of two general types: data base and parametric.

Data Base Input Requirements

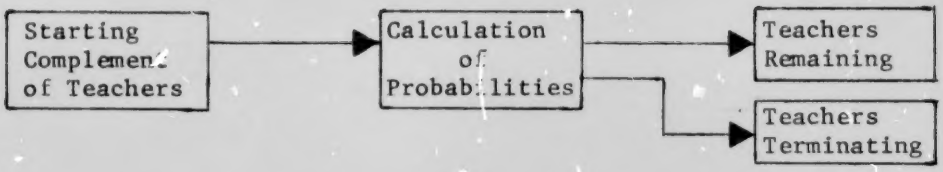
The level of accuracy at which the program performs is directly dependent upon the accuracy and extent of the teacher data base. A minimum list of elements to be contained in the data base would be: social security number, race/sex, termination reason(s) and date(s), course assignments, number of students in each course assignment, and pay grade/pay step. A minimum of three years of teacher data is necessary with four to six years of data being much more desirable. The data base should start with the current or last year and go back in time from there.

Parametric Input Requirements

The user has the ability to specify as few of or as many of the available parametric options as are deemed necessary for a given projection. The available options may be described as being of two general types: 1) those that reference the data base, 2) those that cause deviations from data base trends. Included in the first type of option or variable would be race, sex, subject area, degree, pay grade and pay step. The second type of option would include the ability to specify numbers of teachers and/or students, distribution of teachers and/or students by subject taught or taken, respectively, or by count, and salary changes at any or all levels. Generally, the second type of option can be specified for any or all years of the projection.

Functional Description

The prediction mathematics used in the Faculty Projection Program is a probabilistic process. Using the starting complement of teachers for the current year, the process predicts the status of the group for the next year using transition probabilities calculated from the data base. The diagram below shows the operation of the process.



Some teachers will have received advanced degrees and will be paid on a higher pay grade. Some teachers will switch teaching areas. Some will terminate. Most of the remaining teachers will advance one pay step in the salary schedule. The program anticipates these possibilities by calculating transition probabilities for each possible event. For example, if the salary schedule were limited to three levels and included a provision for terminations, four transition probabilities would be calculated for each salary level. Suppose our three levels are:

1) Bachelor degree with 0-4 years experience
2) Bachelor degree with 5 or more years experience
3) Advanced degree

Suppose further that the historical data shows that 70% of the bachelor degree personnel with 0-4 years experience remain in that pay level for the following year, 10% advance to the 5 or more years of experience level, 10% obtain advanced degrees, and 10% terminate. And suppose that the historical data shows that 75% of the bachelor degree personnel with 5 or more years of experience remain in that pay level, 15% obtain advanced degrees, and 10% terminate. Finally, suppose that 95% of the personnel with advanced degrees stay from year to year. Now by organizing these transition probabilities into rows, the program creates what is called a transition probability matrix.

The transition probability matrix for the above data is represented by:

TRANSITION PROBABILITIES

		BS/0-4	BS/5 or more	Advanced degree	Terminate
SALARY LEVELS	BS/0-4	0.70	0.10	0.10	0.10
	BS/5 or more	0.00	0.75	0.15	0.10
	Adv. Deg.	0.00	0.00	0.95	0.05

If the starting complement of teachers were composed of 40 teachers with 0-4 years of experience, 40 teachers with 5 or more years of experience, and 20 teachers having advanced degrees, then the program would create a starting teacher vector represented mathematically by:

$$\begin{bmatrix} 40 & 40 & 20 \end{bmatrix}$$

By performing a multiplication of the starting teacher vector times the transition probability matrix, the program predicts the status of the group one year later. Vector-matrix multiplication is performed by multiplying each element of the vector by each element of a column in the matrix and summing the results to create an element in the corresponding column of the product vector. For example, the number of bachelor degree personnel with 0-4 years of experience is predicted to be 40 X 0.70 + 40 X 0.00 + 20 X 0.00 = 28.0.

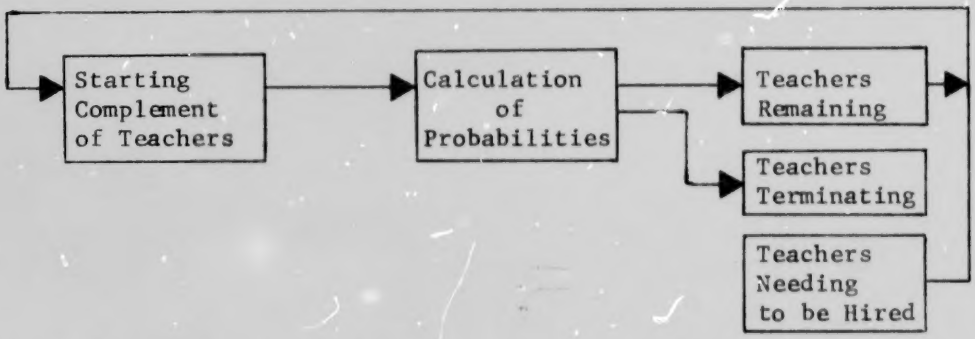
The matrix multiplication is shown by:

$$\begin{bmatrix} 40 & 40 & 20 \end{bmatrix} \times \begin{bmatrix} 0.70 & 0.10 & 0.10 & 0.10 \\ 0.00 & 0.75 & 0.15 & 0.10 \\ 0.00 & 0.00 & 0.95 & 0.05 \end{bmatrix} = \begin{bmatrix} 28 & 34 & 29 & 9 \end{bmatrix}$$

The result of the matrix multiplication predicts 28, 34, and 29 teachers one year later in each salary level, respectively. Nine teachers are predicted to terminate. There were 100 teachers in the starting complement and all 100 are accounted for in the prediction since 28 + 34 + 29 + 9 = 100. The process, therefore, has predicted the number and status of the teacher who will remain and the number of teachers who will terminate at the end of the current school year.

The program predicts next year's starting complement of teachers by using the remaining teachers from the current year and by hiring new teachers as needed. If enrollment and distribution of subjects taken remain similar from one year to the next, terminating teachers will tend to be replaced in the hiring process. If enrollment or distribution of subjects taken or other factors change, the hiring process will reflect the change.

The hiring process is added to the previous diagram to construct the complete faculty flow process as shown below.



The "Teachers Needing to be Hired" block is obtained by the following calculation:

Teachers Needing to be Hired	=	Total Teachers Needed	-	Teachers Remaining

The "Total Teachers Needed" block is obtained from enrollment, class size, subject area distribution and other parameters.

Therefore, by introducing the hiring mechanism to the process, a new "Starting Complement of Teachers" can be calculated. With the new "Starting Complement of Teachers" the process can then be repeated in order to project teacher requirements for the following year, and so on, for up to nine years of projections.

Major Report

The report shown on the following pages is the "Year End Description Report." It uses test data to show the results of applying the projection process to a starting complement of teachers.

The remaining teachers are shown on the line associated with their pay level. The terminating teachers are shown below them on the line associated with their termination reason.

FACULTY PROJECTION PROGRAM

USERS GUIDE

Project Simu-School

Dallas Independent School District

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* not presently functional

SYNOPSIS

PERSIM is the name of the Faculty Projection Program. It is a Fortran computer model for predicting the future state of a public school system, including costs and number of teachers required. PERSIM uses historical information within thirteen possible descriptive variables, as explained under the heading PERSIM VARIABLES, to predict a probabilistic image of future personnel levels and staffing events within a public school system. Various specified changes can be simultaneously imposed upon the model to see their effect upon the future state of the school system.

The model employs an historical data base to formulate the prediction mechanism. The required elements of the data base are given under the heading DATA BASE.

The prediction mechanism employs a Markov chain mathematical method to produce a probabilistic projection for each description of an employee. The employee description is determined by the particular PERSIM variables which have been selected by the user. The PERSIM variables are listed under the heading PERSIM VARIABLES.

Since the program is written in FORTRAN, it can therefore be adapted to run on most medium to large scale computer systems. Peripheral equipment requirements are a disk, two tape drives, a card reader, and a line printer.

PERSIM VARIABLES

Number	Description of Variable	Number of Descriptions within a Variable
1	Race	3
2	Sex	2
3	Subject Area	22
4	Certification Area	28
5	Highest Degree	6 **
6	Professional Status Restricted	4
7	Professional Status & Termination Code	34
8	DISD Salary	undefined **
9	Pay Grade, Pay Step, Termination Code	32
10	Professional Status Without Terminations	27
11	Principal Rating	4 **
12	National Teachers Exam and Year	undefined **
13	Race and Sex in Combination	6

** Variable not presently usable because of insufficient historic data.

The explanation of the separate descriptions within each PERSIM variable are listed in Appendix A.

DATA BASE DEFINITION

The following data description for each teacher is used for historic input to the PERSIM model.

Characters in Field:	Description of Data:
9	Social Security Number
1	Race - Sex
1	1st Termination Code
4	1st Termination Month and Year
1	2nd Termination Code
4	2nd Termination Month and Year
4	National Teacher's Exam Score
2	National Teacher's Exam Year
6	Birth Date
6	Last Date Employed
3	School Number
1	Marital Status
2	Major Duty
4	Study Area
16	Last Name
7	First Name
1	Middle Initial

The following data must be supplied for each academic year:

Up to 6 fields of 6	Texas Course Assignment Code
6 fields of 3 corresponding to above	Number of Pupils in Courses
6 fields of 2 corresponding to above	Number of Classes Taught
1	Highest Degree
2	Total Experience
4	Professional Status
5	DISD Salary, Actual
1	Pay Grade
2	Pay Step
5	Foundation Salary
2	Principal Rating

PERSIM CONTROL CARD DEFINITIONS

No.	Mnemonic	Employing S.R.	Definition
-	999999	-All-	End of control cards, pseudo E.O.F.
1	BASINC	PRTMAT	Teacher base salary for system
2	INDEX	PRTMAT	Pay index value (X teacher base salary for each pay grade/pay scale)
3	INPMAT	PRTMON	Starting vector annual summation chart
4	OUTMAT	PRTMON	Annual summation charts of vector after transition matrix has been applied, see MARKOV TRANSITION MATRIX Section.
5	TRMMAT	PRTMON	Terminating vector annual summation charts
6	HIRMAT	PRTMON	Hiring vector annual summation charts
7	INPVEC	REPORT	Detailed printout of starting vector for all years
8	OUTVEC	REPORT	Detailed printout description for all years of the vector after the transition matrix has been applied, see MARKOV TRANSITION MATRIX Section.
9	TRMVEC	REPORT	Detailed printout of terminating vectors for all years.
10	HIRVEC	REPORT	Detailed printout of hiring vector for all years.
11	PUPILS	NEWGEN	Number of secondary pupils in system
12	TEACHR	NEWGEN	Number of secondary teachers in system
13	PTRATO	RTSHRT	Secondary level pupil/teacher ratio
14	PUPARA	RTLONG	Fraction of secondary pupils taking different teaching areas.
15	CLASSS	RTLONG	Number of classes held in different teaching areas
16	CLSSIZ	RTLONG	Size of average class in different teaching areas
17	CLSTCH	RTLONG	Average number of classes taught per teacher in teaching area

PERSIM CONTROL CARD DEFINITIONS (Continued)

No.	Mnemonic	Employing S.R.	Definition
18	EPUPIL	NEWGEN	Number of elementary pupils
19	ETEACH	NEWGEN	Number of elementary teachers
20	EPTRAT	NEWGEN	Elementary pupil/teacher ratio
21	HIRERQ	NEWGEN	Fractional distributions within PERSIM variables for hiring procedures.
22	TCHREQ	RTLONG	Number of teachers required in each teaching area
23	CLSPPU	RTLONG	Average number of classes per secondary pupil
24	ECLSPP	RTLONG	Average number of classes per elementary pupil
25	PUPCLS	RTLONG	Number of pupils in classes by teaching area
26	NOVECS	REPORT	Do not print any complete descriptions of the vectors
27	NOMATS	PRTMON	Do not print any annual summation charts
28	RTLONG	RTLONG	Select the RTLONG subroutine for hiring procedure
29	RTSHRT	RTSHRT	Select the RTSHRT subroutine for hiring procedure
30	RTOLD	RTOLD	Select the RTOLD subroutine for hiring procedure
31	OLDDIS	OLDDIS	Store starting vector distribution in HIRERQ Array for one PERSIM variable
32	ORDVEC	REPORT	Organize the detailed vector printouts to be grouped in the sequence specified
33	OLDPUP	RTLONG	Store the starting vector distribution in PUPARA array.
34	ADIVEC	MCP	Adjust the initial starting vector for known changes.
35	TMAT	TMATAV	Define which years of history and the corresponding weighting to be used for creating the transition matrix.

PROGRAM DESCRIPTION

PERSIM contains two major segments.

SEGMENT ONE, FORMULATION OF PREDICTION EQUATIONS

The first segment examines the historic data base, determines which variables have been selected, and from these two inputs creates the prediction mechanism, a Markov transition matrix. The transition matrix created and written on tape by segment one is employed in segment two to predict the school system's state in future years. A description of the teachers presently in the system is also accumulated by segment one and written on the tape.

Control information, in the form of PROGRAM DEFINITION CONTROL CARD must be read into the program to select the PERSIM variables desired. There are 13 possible variables to choose from, of which Pay Grade/Pay Scale/Termination Code (PG/PS/TC) (PERSIM variable 9) must be selected. Up to three additional variables may be selected in addition to PG/PS/TC, at the user's discretion. Some care must be taken in the variable selection to assure that the maximum sizes of all the variables (see PERSIM VARIABLES) multiplied together will not exceed 10,100.

Segment one is a high cost portion of the program and need only be run once on the historic data for any particular combination of PERSIM variables.

SEGMENT TWO, ANNUAL PREDICTIONS

Segment two uses the prediction equations formulated in segment one to project the state of the school system for up to nine years into the future.

The prediction mathematics, a Markov chain, will predict the terminations as well as the description of the teachers remaining in the system. The user, by specifying the size of the school system and a method for hiring new teachers, will control the augumentation of the personnel from year to year. There are three methods at the user's disposal for calculating the teachers required:

Short Method - This method uses systemwide pupil/teacher ratios at the secondary and elementary levels to project future teacher requirements (see SHORT METHOD OF HIRING).

Long Method - This method employs Subject Area or Certification Area (PERSIM variables 3 or 4) using area by area pupil/teacher ratios and average class size to project future teacher requirements. This method generally presumes accurate and complete knowledge of the present state of the school system concerning percentage of students in each area. class sizes, classes per student, and classes per teacher (see LONG METHOD OF HIRING).

Old Method - This method employs the short method above for calculating the quantity of teachers needed, but forces the hiring to be such that the following years teacher distribution within each PERSIM variable will remain identical to the present year's data (see OLD DISTRIBUTION HIRING METHOD).

The printed results are of two forms (see Appendix C).. The first format

tabulates two PERSIM variables for each year the projection is made. All combinations of PERSIM variables and all four teacher vectors can be printed along with their costs. The second format for printed results is a summary of all years of the number of teachers within each description state of the four teacher vectors. This is a complete detailed summary of the teachers involved.

All three hiring methods force racial balance upon the overall school system to a predetermined level. The level is 25% non-white at present.

This second segment of the program is relatively inexpensive and can be re-run many times using one output tape from segment one. A wide variety of "what if", "how much", and "how many" type of questions can be answered by changes introduced by control cards, as explained in the sections that follow. Segment two can be run in conjunction with segment one or separately, as determined by the PROGRAM DEFINITION CONTROL CARD.

TEACHER VECTOR DESCRIPTION

A teacher vector is a complete description of all teachers in a grouping according to the PERSIM variables selected. It is important to understand this concept since the words "teacher vector" occur repeatedly throughout this document. An example of a section of a teacher vector printout is given in Appendix B.

There are four distinct groupings or teacher vectors in the model.

- Starting or Required Teacher Vector
- Output Teacher Vector
- Terminating Teacher Vector
- Hiring Teacher Vector

The relationship of these four vectors is explained under MARKOV TRANSITION MATRIX. A teacher vector is collectively exhaustive in its description of all the teachers in a grouping.

A description within a vector depends upon the PERSIM variable selected. The descriptions represent all possible combinations of the PERSIM variables selected. For instance, if Pay Grade/Pay Step/Termination Code (PG/PS/TC) and Subject Area are selected, PERSIM variables 9 and 3, there would be 704 possible descriptions in a vector (32 possible PG/PS/TC times 22 possible Subject Areas) representing all combinations of the two variables. The vector descriptions would start:

TEACHER VECTOR DESCRIPTION

Continued

Index	Description
1	PG 1, PS 0 - Agriculture
2	PG 1, PS 0 - Art
3	PG 1, PS 0 - Business
4	PG 1, PS 0 - Distributive Education
...	

After proceeding through all 22 areas within Subject Area, the Pay Step would change to 1 and all 22 Subject Areas would again be paired with the new pay step. This process proceeds until all PG/PS/TC's have been paired.

If 3 or 4 PERSIM variables are selected, then the process is expanded to include all combinations of all variables. The maximum number of descriptions, or combinations of variables, rapidly increases with the maximum size of the PERSIM variables selected. For instance, if PG/PS/TC, Subject Area, and Race/Sex are selected, the vector size increases to 4224 (32 times 22 times 6). In this example, a section of the teacher vector would appear as follows:

Index	Description	
688	PG 1, PS 5 - English	Black/Female
689	PG 1, PS 5 - English	Other/Male
690	PG 1, PS 5 - English	Other/Female
691	PG 1, PS 5 - Foreign Language	White/Male
692	PG 1, PS 5 - Foreign Language	White/Female
...		

MARKOV TRANSITION MATRIX

The projection mathematics for the PERSIM model use a Markov transition matrix. This matrix uses historic information to project what the description of a teacher will be from year to year in the future. The projection typically would project a teacher to go to the next higher pay step or perhaps to a higher pay grade, or to one of the various termination descriptions. The projection is probablistic and is based upon the PERSIM variables selected with respect to the historic data base.

The Markov transition matrix is the mathematics used to relate the four teacher vectors. The four vectors are:

Input or Required Vector - For the first year, this vector represents the actual teachers in the system today. For the following years, this vector is the sum of the teachers who are remaining and the teachers who have been hired. In specific:

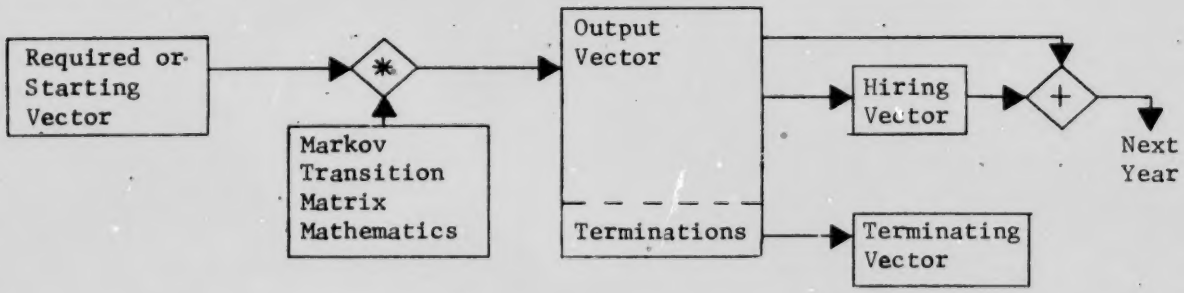
Output Vector	−	Termination Vector	+	Hiring Vector	=	Input or Required Vector

Output Vector - This is a description of all the teachers at the end of the year. After the Markov transition matrix is applied to the year's Input Vector, the resulting changes predicted for the teachers in the system is the Output Vector. This vector includes terminations as well as all the teachers remaining in the system. All of the teachers remaining in the system now have one additional year of experience and some have acquired additional degrees.

Termination Vector - This is a description of all the teachers who will terminate employment during the year. This is a subdivision of the Output Vector.

Hiring Vector - This is a description of all the teachers who will be hired for a year. For the most part, these are the teachers who will replace the terminating teachers. The required vector for the following year will be the sum of the teachers who do not terminate and the Hiring vector. The Hiring vector is generally calculated by finding the difference between the teachers who do not terminate, and the teachers that will be required next year. The positions that remain constitute the Hiring vector.

The diagram below is an example of the transition cycle for one year:



PROGRAM CONTROL

The PERSIM model is controlled through data cards entered at the time of program execution. The data cards, called control cards, enable the user to change every important parameter in the model. All variables within the model have default values in case no information has been inserted by the user through control cards (see Appendix B). As would be expected, certain parameters must always be specified to make a run meaningful. These parameters are entered by the PROGRAM DEFINITION CONTROL CARD. Additional optional control cards may be used to indicate the changes to be made in modifying the future school system, all at the users discretion.

Below, under various headings, each control card is explained with its appropriate card column (CC) locations. The first control card, the PROGRAM DEFINITION CONTROL CARD and the last control card, "999999" must always be entered, but all other control cards are optional.

All control cards have a description mnemonic in card column 1 through 6.

A sample printout of the control cards for a typical run is presented below.

C O N T R O L C A R D S

```
 1 PROGRAM
 2 PCOSTS  9
 3 ATTRIT1
 4 ENROLL      6073.  5104.  5373.  5036.  4741.
 5 POSTLS      5556.  5547.  5533.  6252.  5970.
 6 CLSPP1      0.648  0.648  0.648  0.648  0.648
 7 FCLSPP        1.     1.     1.     1.     1.
 8 CLSSIZ1  0 22.500 20.821 20.586 18.744  9.182 15.250 22.500 22.500 22.500 22.500
 9 CLSSIZ1  0  5.000  5.407 12.500  3.571  5.000 22.300 20.000 21.938 23.027  9.000
10 CLSSIZ1  0  8.000 31.793 23.382 13.478 23.847 15.000 45.000 44.000  3.917 20.167
11 CLSSIZ1  0 14.005
12 ANSINC   2     5.     5.     5.     5.     5.
13 999999
   0   ERRORS FOUND IN CONTROL CARDS
```

3.A1

PROGRAM CONTROL CONTROL CARDS

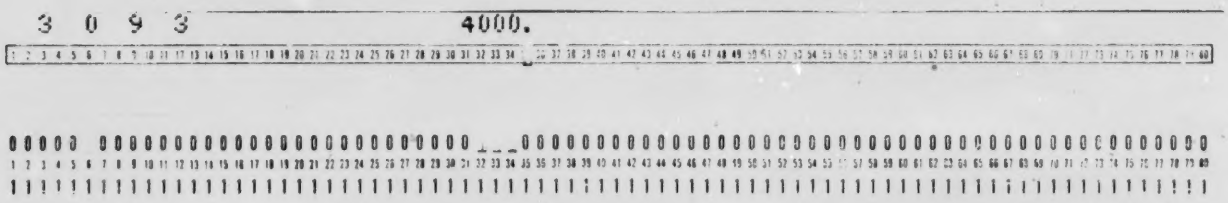
PROGRAM DEFINITION CONTROL CARD

Function: This card defines what the program will do. It tells the number of years of projection, whether or not a new segment two input tape is to be generated (see PROGRAM DESCRIPTION). which PERSIM variables are to be selected, and how many teachers are in the school system at present. This is always the first control card in the data deck. If an old segment two input tape is to be used, the PERSIM variables selected must match the ones used before.

Description:

Card Column	Contents	Explanation
CC1-3	Years of Projection	
CC4-6	Input tape	0 = generate a new tape 2 = use old tape
CC7-9	PERSIM variable	Select PERSIM variables desired.
CC10-12	PERSIM variable	
CC13-15	PERSIM variable	
CC16-18	PERSIM variable	
CC19-30	Blank	
CC31-35	Teachers	Numbers of teachers presently in system. Include decimal point.
CC36-80	Blank	

Example: A 3-year projection will generate a new segment two input tape, will use PERSIM variables 9 and 3, and will have 4000 teachers to start with. This card must be the first control card in the data deck.



PROGRAM CONTROL CONTROL CARDS

TMAT

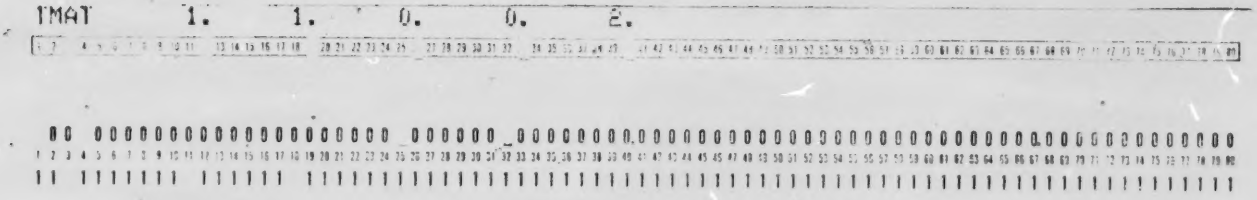
Function: This control card determines which years of transition in the historic data base will be used in creating the Markov transition matrix. The card also determines the weighting factors applied to each year selected. All years are used and are weighted equally if this control card is omitted.

The purpose of this card is to allow bad historic years to be eliminated and to make recent years, when information might be more relevant, have a greater influence upon the transition matrix.

Description:

Card Column	Contents	Explanation
CC1-6	"TMAT"	
CC7-10	Blank	
CC11-17	Weighting Yr 1 Transition	Include decimal point
CC18-24	Weighting Yr 2 Transition	in all numbers
CC25-31	Weighting Yr 3 Transition	
CC32-39	Weighting Yr 4 Transition	
CC40-46	Weighting Yr 5 Transition	
CC47-80	Blank	

Example: The user knows that the data for school year 1969-70 is bad and wishes to eliminate it from the program. This means that the two transition years of 1968-69 to 1969-70 and 1969-70 to 1970-71 are to be eliminated. These are transition years 3 and 4 since the data base starts with 1966-67. It is also desired to weight the last year, transition 5, twice as much.



PROGRAM CONTROL CONTROL CARDS

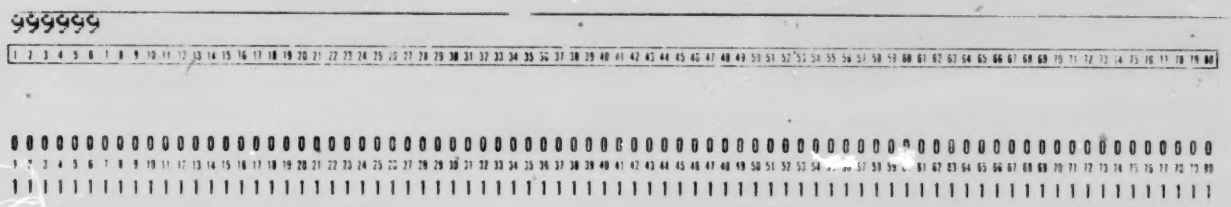
999999

Function: The last card in the control card string must always be this card. This is a pseudo end of file card that the program uses as an indicator for the end of control card.

Description:

Card Column	Contents	Explanation
CC1-6	"999999"	
CC7-80	Blank	

Example: The last card in every deck of control cards must be as follows:



INITIALIZING CONTROL CARDS

The following control cards are generally used before any predictions are made. These cards initialize various parameters within the program including correction of input data.

INITIALIZING CONTROL CARDS

ADIVEC

Function: This card is used for adjusting the initial starting teacher vector. After a retrieval from the data base is complete, many of the teachers known to be in the system may be rejected because of various data editing procedures. Many of the rejected people in the latest year will not show up in the initial starting teacher description written by segment one of the main program. (See PROGRAM DESCRIPTION). This control card is used to factor all entries of the initial starting vector that are known to be associated with one description of one particular PERSIM variable. See example below.

Description:

Card Column	Contents	Explanation
CC1-6	"ADIVEC"	
CC7-8	Blank	
CC9-10	Variable	PERSIM variable to be changed, see PERSIM VARIABLES.
CC11-17	Location	Position within PERSIM variable. This description must be looked up in Appendix A, PERSIM VARIABLE DESCRIPTIONS. Include decimal point.
CC18-24	Teachers	Number of teachers desired in the selected PERSIM variable description. Include decimal point.
CC25-80	Blank	

Example: It is known that there are 3000 elementary teachers this year and PERSIM variable 3, Subject Area, has been selected. The following card will factor all associated entries in the initial vector to reflect 3000 elementary teachers. Elementary teacher is Position 19 within PERSIM variable 3, as noted in PERSIM VARIABLE DESCRIPTIONS. It should be noted that any change will be spread throughout all descriptions of elementary teachers. That is, if Race is selected, then the elementary teacher's race entries will be factored without affecting the race entries in other subject areas. This change will, however, affect the overall race totals.

```
ADIVEC   3 19.   3000.
```

.INITIALIZING CONTROL CARDS

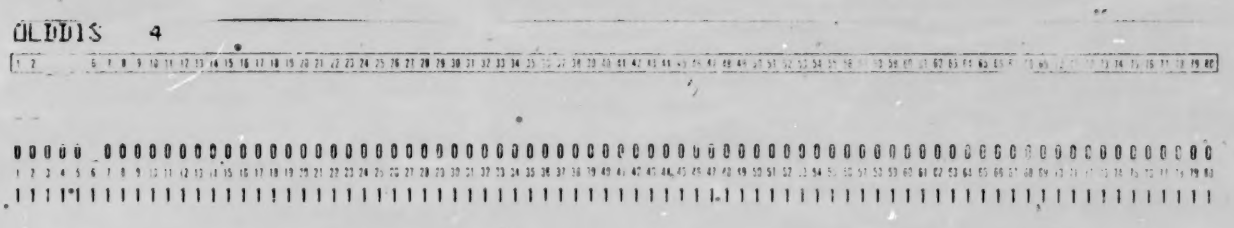
OLDDIS

Function: Find the distribution of the indicated PERSIM variable in the starting teacher vector and use this distribution for future hiring. The distribution is stored in the HIRERQ buffer (see NEWGEN subroutine description). The new distribution may be modified by subsequent control cards. This option allows consistent predictions upon systems where the data is incomplete and/or inaccurate as well as where the distribution within a PERSIM variable is not known by the user. The OLDDIS option is especially useful when PERSIM variable RACE or SUBJECT AREA is selected.

Description:

Card Column	Contents	Explanation
CC1-6	"OLDDIS"	
CC7-8	Blank	
CC9-10	Integer Variable	PERSIM variable to be modified, see PERSIM VARIABLES. See DEFAULT DATA for preprogrammed values.

Example: The actual distribution within certification code, PERSIM variable 4, is not known. Also, the initial starting teacher vector is known to be inaccurate due to date errors. To prevent distortions in the first year's hiring it is desired to start with the same distribution within certification code as in the initial starting teacher vector. The following control card is used.



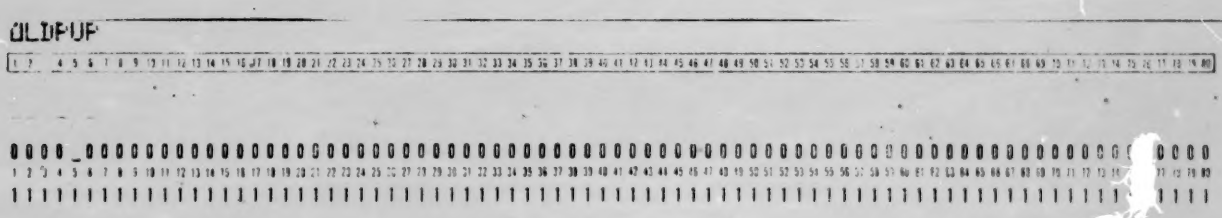
OLDPUP

Function: This card finds the initial starting vector student distributions within subject or certification area when using the long method for hiring projections (see RTLONG subroutine and control card). When the long method for hiring, RTLONG, is not selected, this card is meaningless. Whether PERSIM variable 3, Subject Area, or 4, Certification Area, is actually being used is determined internally by the program and need not be specified by the user. The calculated distribution is based upon the starting teacher vector, average class size, and the average class taught per teacher in each area. The initial distribution serves only as a base for future years and may be changed by subsequent control cards. This control card is used when complete information about the system is unavailable or when the starting vector is inaccurate or incomplete.

Description:

Card Column	Contents
CC1-6	"OLDPUP"
CC7-80	Blank

Example: The long method of teacher hiring is selected (see RTLONG subroutine and control card). Percentages of student taking different subject areas are not known accurately. It is also desired to prevent dramatic distortions in the first year's hiring requirements. The following control card is used.



COST OF TEACHERS

The cost of the teachers in the system are calculated based upon a teacher base salary and specific indexes for experience and education. The present system calls for three grades, being Bachelor's Master's, and Doctoral degrees, with corresponding steps for years of experience in each grade.. The table of default indexes is in Appendix B. The following control cards can be used to change the teacher base salary and the indexes:

COST OF TEACHERS CONTROL CARDS

BASINC

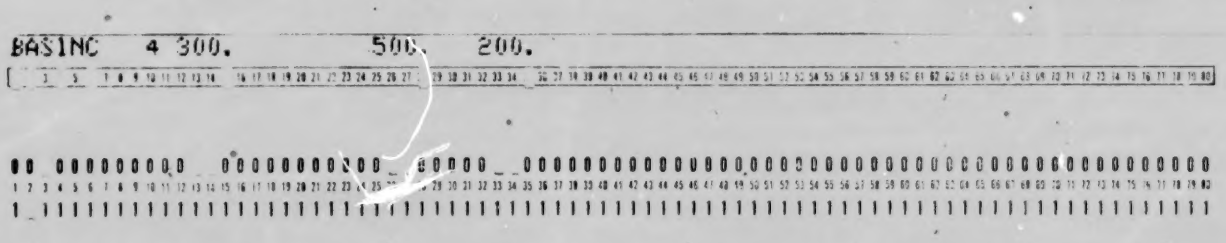
Function: This card changes the teacher base salary for all years of the projection. The teacher base salary is multiplied by various indexes to get the salary of teachers with different education and experience. There are 5 options available for changing the teacher base salary:

Option	Information in data fields	Change in Teachers' Base Salary
1.	Blank	Increase by 4% in each year of the projection.
2.	Percentage	Increase by the percentages specified for each corresponding year.
3.	Dollar increment, one entry	Increase every year by this amount.
4.	Dollars increment	Increase by individual amounts specified for each corresponding year.
5.	Dollar values	Replace existing entry with this year by year data.

Description:

Card Column	Contents	Explanation
CC1-6	"BASINC"	
CC7-9	Blank	
CC10	Option	See Above.
CC11-17	Year 1 data	Include decimal point.
CC18-24	Year 2 data	Include decimal point.
CC25-31	Year 3 data	Include decimal point.
CC32-38	Year 4 data	Include decimal point.
CC39-45	Year 5 data	Include decimal point.
CC46-52	Year 6 data	Include decimal point.
CC53-59	Year 7 data	Include decimal point.
CC60-66	Year 8 data	Include decimal point.
CC67-73	Year 9 data	Include decimal point.
CC74-80	Year 10 data	Include decimal point.

Example: Increase the teacher base salary by $300, nothing, $500, and $200 in four years of projection. This uses option 4.



COST OF TEACHERS CONTROL CARDS

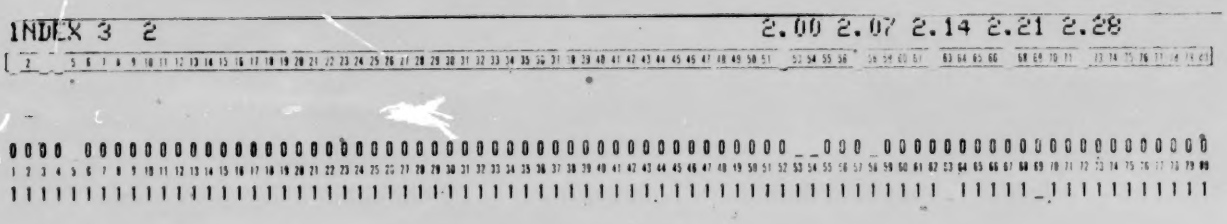
INDEX

Function: This card changes the index used in calculating actual salary from the teacher base salary. The indexes are grouped according to pay grades (Bachelor's Master's, Doctorate) and are divided according to years of experience. Each control card changes all experience levels within one pay grade for one year of the projection. Entries that are blank are bypassed and non-blank entries replace existing indexes.

Description:

Card Column	Contents	Explanation
CC1-6	"INDEX"	
CC7	Year	
CC8-9	Blank	
CC10	Pay Grade	
CC11-15	Pay Step 0	Include decimal point
CC16-20	Pay Step 1	Zero entries are skipped.
CC21-25	Pay Step 2	Pertinent steps are
CC26-30	Pay Step 3	0-10 Bachelor's
CC31-35	Pay Step 4	0-12 Master's
CC36-40	Pay Step 5	0-13 Doctorate
CC41-45	Pay Step 6	
CC46-50	Pay Step 7	
CC51-55	Pay Step 8	
CC56-60	Pay Step 9	
CC61-65	Pay Step 10	
CC66-70	Pay Step 11	
CC71-75	Pay Step 12	
CC76-80	Pay Step 13	

Example: It is desired to increase the step rate to 7% for Masters degree with 8 years of experience or greater in year 3. The index for Pay Grade 2, Step 8 is to be 2.00.



PRINTOUT CONTROL CARDS

There are ten control cards used to determine the amount and type of printout. The default condition, if none of the control cards are employed, is to print all material available. There are two types of printout. The first type is a year by year grouping of each PERSIM variable selected for that run against every other PERSIM variable selected. The second type of printout is a detailed description by description listing of the entire teacher vector with all years being grouped together. An example of the first types of listings is given in Appendix C.

PRINTOUT CONTROL CARDS

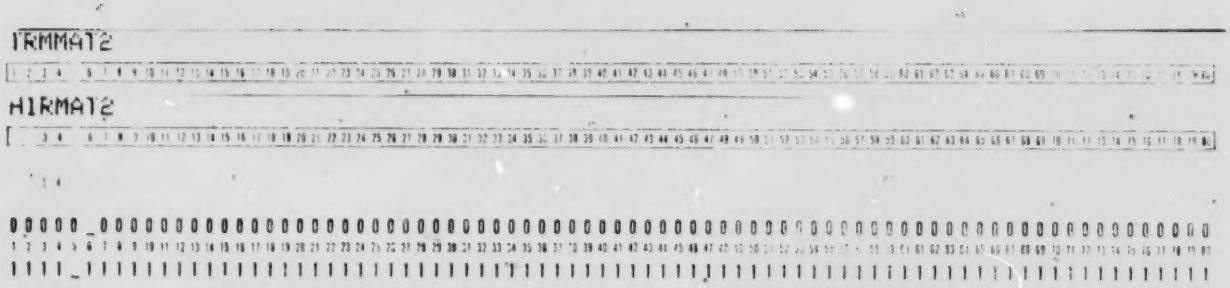
INPMAT, OUTMAT, TRMMAT, HIRMAT

Function: These control cards select which teacher vector (see TEACHER VECTOR DESCRIPTION) will be printed in the annual charts. The cards may be omitted or used in any combination. The cards stand for the 4 corresponding teacher vectors of input, output, termination, and hiring. If none of the above cards are used, the program prints all vectors. The printout consists of each PERSIM variable selected versus every other PERSIM variable selected, as shown in the example in Appendix C. The printout is a two dimensional array of cost and counts of teachers in each description in the array. If two PERSIM variables are selected for a run, there would be one chart produced for each vector for each year. If there are 3 PERSIM variables selected there will be 3 charts produced for each vector (the number of combinations of 3 items taken 2 at a time is 3) and 6 charts if 4 variables are selected.

Description: (4 cards)

Card Column	Contents	Explanation
CC1-6	"IMPMAT"	Print input teacher vector charts for year given.
CC7	Year	
CC8-80	Blank	
CC1-6	"OUTMAT"	Print output teacher vector charts for year given.
CC7	Year	
CC8-80	Blank	
CC1-6	"TRMMAT"	Print termination teacher vector charts for year given
CC7	Year	
CC8-80	Blank	
CC1-6	"HIRMAT"	Print hiring teacher vector charts for year given.
CC7	Year	
CC8-80	Blank	

Example: Print only the termination and hiring teacher vector charts for year 2. If none of the above control cards is used all vectors will be printed.



PRINTOUT CONTROL CARDS

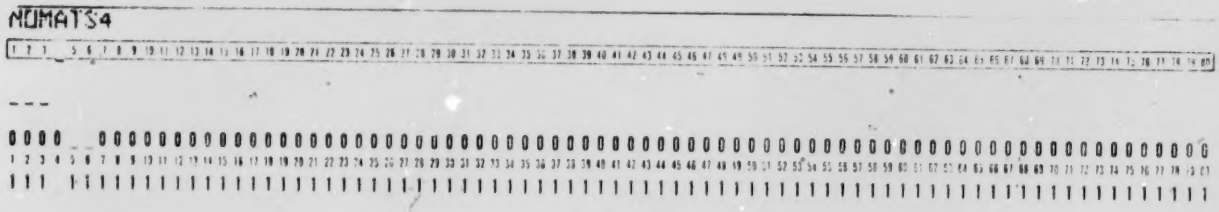
NOMATS

Function: This card deletes all printing of the annual charts of PERSIM variables for the year indicated.

Description:

Card Column	Contents	Explanation
CC1-6	"NOMATS"	
CC7	Year	
CC8-80	Blank	

Example: Delete all charts for year 4.



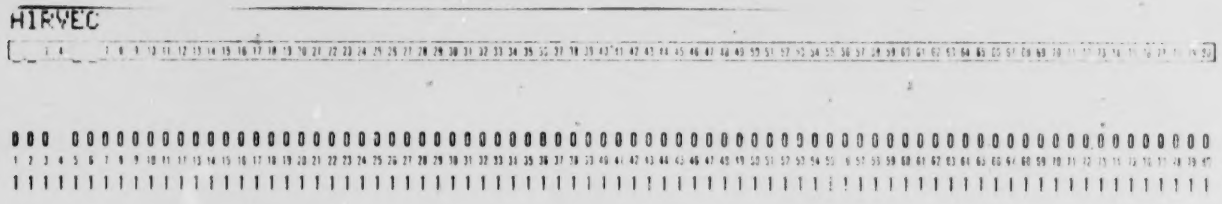
PRINTOUT CONTROL CARDS

INPVEC, OUTVEC, TRMVEC, HIRVEC *

Function: These cards select which teacher vector (see TEACHER VECTOR DESCRIPTION) will be printed in detailed charts at the end of the program. The cards may be used in any combination or omitted, in which case all vectors are printed. The cards correspond to the 4 teacher vectors of input, output, termination, and hiring. The printout consists of detailed item by item listing of each description within the teacher vector, as shown in Appendix C. All years of the projection are grouped on the same line, and lines that are blank are omitted.

Description: (4 Cards)	Card Column	Contents	Explanation
	CC1-6	"INPVEC"	Print input vector.
	CC7-80	Blank	
	CC1-6	"OUTVEC"	Print output vector.
	CC7-80	Blank	
	CC1-6	"TRMVEC"	Print termination vector.
	CC7-80	Blank	
	CC1-6	"HIRVEC"	Print hiring vector.
	CC7-80	Blank	

Example: Print the detailed description of the hiring vector only.



*not presently functional

PRINTOUT CONTROL CARDS

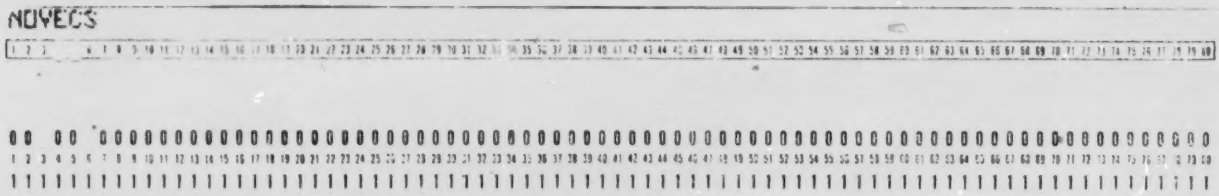
NOVECS *

Function: This card deletes printing of all detailed description by description printout of teacher vectors at the program's end.

Description:

Card Column	Contents	Explanation
CC1-6	"NOVECS"	
CC7-80	Blank	

Example: Delete all detailed vector printouts.



* not presently functional

PRINTOUT CONTROL CARDS

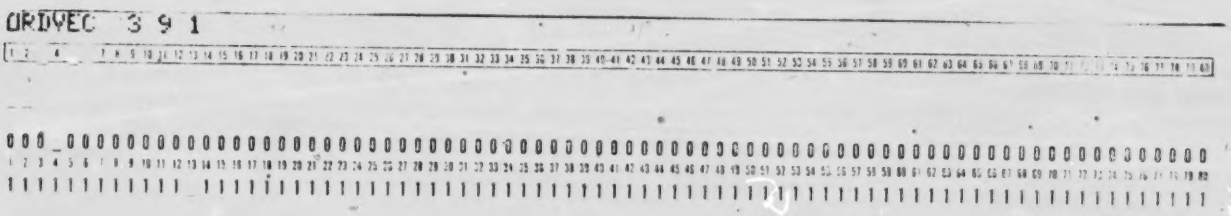
ORDVEC *

Function: This control card determines the order in which the selected PERSIM variables will be varied on the detailed vector printout.

Description:

Card Column	Contents	Explanation
CC1-6	"ORDVEC"	
CC7	Blank	
CC8-9	1st variable	Order that variables
CC10-11	2nd variable	are to be varied in.
CC12-13	3rd variable	
CC14-15	4th variable	
CC16-80	Blank	

Example: Print PERSIM variable 3 before 9 and 1.

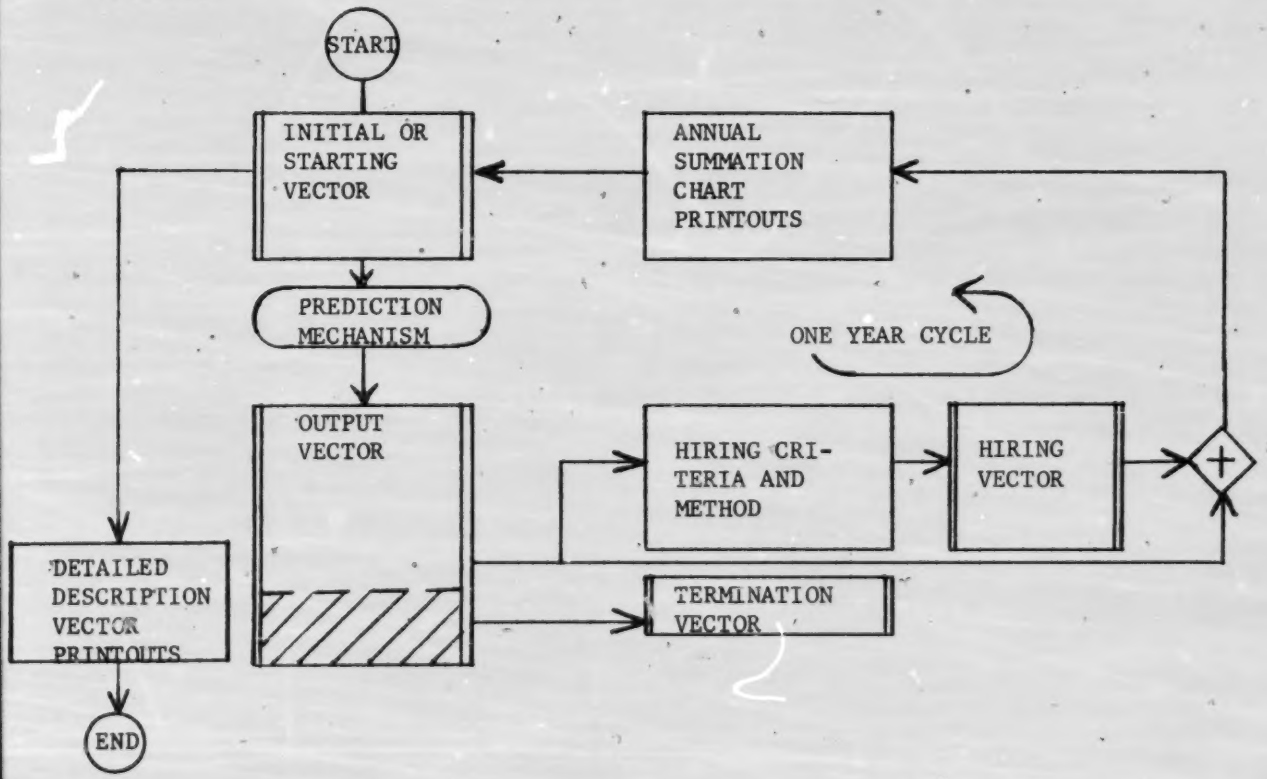


* not presently functional

HIRING CRITERIA

PERSIM contains three methods of determining the hiring requirements for the school system. Each method has control cards peculiar to it alone in addition to the general control cards which apply to all methods. The control cards pertinent to each section are grouped together under the appropriate headings. The general control cards which apply to all methods are listed below..

It should be pointed out that all predictions follow a similar path of calculations, yielding four distinct teacher vector description types (see MARKOV TRANSITION MATRIX). A teacher vector is merely a description of all the teachers in the system by PERSIM variable (see TEACHER VECTOR DEFINITION). The logic flow of the calculations is as follows. Notice 4 distinct teacher vectors.



GENERAL HIRING CONTROL CARDS -- affect all three hiring methods.

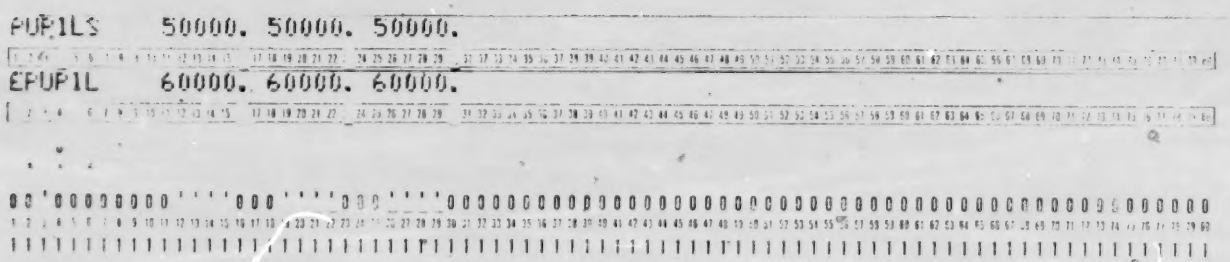
PUPILS, EPUPIL

Function: These cards describe the overall number of secondary and elementary students in the school system. The number of pupils will ultimately determine the number of teachers required under all three hiring methods, as explained within each method.

Description: (2 control cards)

Card Column	Contents	Explanation
CC1-6	"PUPILS"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year projected number of secondary students in the school system. Include decimal point. See DEFAULT DATA for pre-programmed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	
CC1-6	"EPUPIL"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year projected number of elementary students in school system. Include decimal point. See DEFAULT DATA for pre-programmed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	

Example: There are 50,000 secondary and 60,000 elementary pupils projected to be in the system for years 1 through 3.



GENERAL HIRING CONTROL CARDS --- affect SHORT and LONG METHODS OF HIRING

HIRERQ

Function: This card changes the fractional distribution in which teachers will be hired. The various PERSIM variables fall into two distinct types.

Physical or Legal restriction types---Subject Area, and Certification Area hiring is determined by physical limitations. That is, the requirements will be determined by which courses pupils will be taking and how many teachers remain from year to year. The Race variable is determined by law, so hiring must be done in a manner such that the next years racial mix will meet legal requirements.

Arbitrary types---all other PERSIM variables can be assigned arbitrary distributions for hiring. For instance, the education level and experience level of the new hires can be set at any distribution desired.

The total of the hiring distribution entries within each PERSIM variable must be 1.0. There are default values for all variables. If the user wishes to employ historic ratios, the OLDDIS control card can be employed (see INITIALIZING CONTROL CARDS).

There are 5 options available when using the HIRERQ control card.

Option	Description
0 or Blank	Replace existing information for hiring distribution with information on this contiguous string of cards. Each card contains 10 entries with the first card starting in location 1 and the following cards commencing where the prior card left off. That is, card 1 enters areas 1 through 10, card 2 enters areas 11 through 20, and so on. Zero entries are not ignored.

1 through 4 modify only selected areas. Since the total of the distribution within a PERSIM variable must be 1.00, any increase in one area must be accompanied by corresponding decreases in other areas.

1. Increment one area by the given amount and have the other areas listed evenly absorb the corresponding amount. For example, if 3 other areas are indicated, then the change will be split evenly 3 ways.

GENERAL HIRING CONTROL CARDS ---affect SHORT and LONG METHODS OF HIRING

HIRERQ, continued

Option	Description
2.	Increment one area by the given amount and have the other areas listed absorb the corresponding change on a decreasing basis. The first area will absorb 50%, the second area will absorb 25%, and so on, with each succeeding area absorbing one half of the remaining change. The last entry will absorb all that remains.
3.	Increment one area by the given percentage and have the other areas listed evenly absorb the corresponding amount. This option is the same as option 1 except a percentage instead of an amount is used.
4.	Increment one area by the given percentage and have the other areas listed absorb the corresponding change on a decreasing basis. This option is the same as option 2 except a percentage instead of an amount is used.

Description:

Card Column	Contents	
CC1-6	"HIRERQ"	
CC7	Year	
CC8	Option	
CC9-10	PERSIM VARIABLE	
	Option "0"	Other Options
	(Include decimal point on all entries below)	
CC11-17	Data area 1, (or 11 on 2nd card, etc.)	Area to be incremented.
CC18-24	Data area 2	Amount or percentage, as explained under option, to be changed.
CC25-31	Data area 3	1st area to absorb change.
CC32-38	Data area 4	2nd area to absorb change.
CC39-45	Data area 5	3rd area to absorb change.
CC46-52	Data area 6	4th area to absorb change.
CC53-59	Data area 7	5th area to absorb change.
CC60-66	Data area 8	6th area to absorb change.
CC67-73	Data area 9	7th area to absorb change.
CC74-80	Data area 10	8th area to absorb change.

GENERAL HIRING CONTROL CARDS --- affect SHORT and LONG METHOD OF HIRING

HIRERQ, continued

Example: It is desired to change the Race distribution entirely, as indicated below. It is also desired to decrease Pay Grade 1, Step 0 hiring by 10% while hiring more Pay Grade 2, Steps 0 through 5. This uses option 3 on an average basis.

```
HIRERQ1  1 .70   .28      .01    .01
HIRERQ13 9 1.    -10.     12.    13.    14.    15.    16.
```

SHORT METHOD OF HIRING

This method of calculating hiring requirements uses a system-wide pupil/teacher ratio. The equation is simply:

$$\frac{\text{Number of pupils}}{\text{Pupil/teacher ratio}} = \text{Teachers required}$$

A distinction between secondary and elementary teachers is made because of the obvious division. Control cards for the short method of hiring follow.

SHORT METHOD OF HIRING CONTROL CARDS

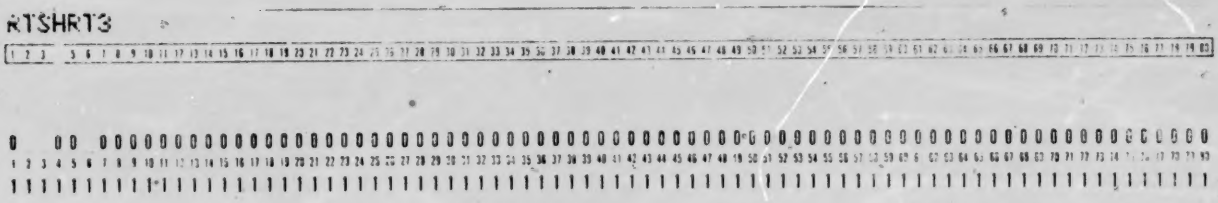
RTSHRT

Function: This card causes the short method of calculating hiring requirements to be used starting in the year indicated. This method remains selected for the following years or until subsequently changed.

Description:

Card Column	Contents	Explanation
CC1-6	"RTSHRT"	
CC7	Year	Year of projection when short method is to begin being used.
CC8-80	Blank	

Example: Use short method of hiring (overall pupil/teacher ratio) to project teacher requirements starting in Year 3.



SHORT METHOD OF HIRING CONTROL CARDS

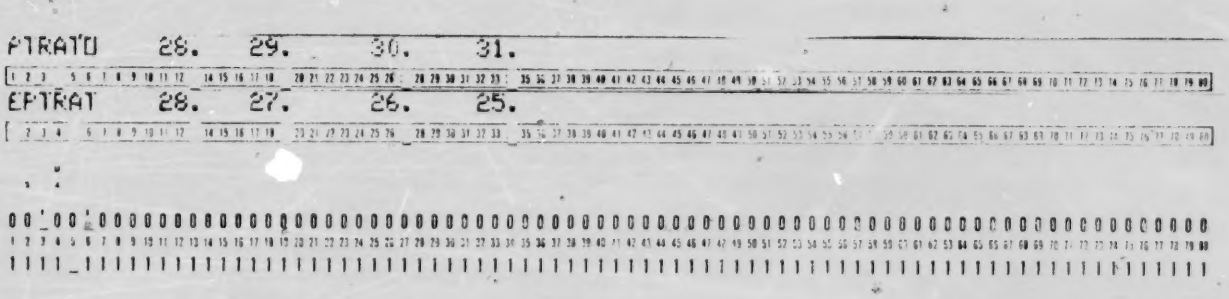
PTRATO, EPTRAT

Function: These cards specify the secondary or the elementary systemwide average pupil/teacher ratio for each year of the projection. The use of this ratio is explained under SHORT METHOD OF HIRING.

Description:

Card Column	Contents	Explanation
CC1-6	"PTRATO"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year systemwide average secondary pupil/teacher ratio. Include decimal point. See DEFAULT DATA for preprogrammed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	
CC1-6	"EPTRAT"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year systemwide average elementary pupil/teacher ratio. Include decimal point. See DEFAULT DATA for preprogrammed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	

Example: The first year secondary and elementary pupil ratios are 28:1. The secondary ratio goes up 1 per year and the elementary ratio goes down 1 per year for the 3 additional years of the projection. The following control cards are used:



SHORT METHOD OF HIRING CONTROL CARDS

TEACHR, ETEACH

Function: These cards allow the user to specify the exact number of elementary and secondary teachers that are to be employed in the separate years of the projection. If an entry for a year is non-zero, then all calculations to find the number of teachers required, as explained under SHORT METHOD OF HIRING, are bypassed. The number on the control card is used instead. One card contains data for all years of the projection.

Description: (2 control cards)

Card Column	Contents	Explanation
CC1-6	"TEACHR"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year total number of secondary teachers to be employed. Include decimal point. Blank entries are ignored and normal calculations for hiring are performed as explained under SHORT METHOD OF HIRING.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	
CC1-6	"ETEACH"	
CC7-10	Blank	
CC11-17	Year 1 data	Year by year total number of elementary teachers to be employed. Include decimal point. Blank entries are ignored and normal calculations for hiring are performed as explained under SHORT METHOD OF HIRING.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	

Example: There are 3000 and 3500 secondary teachers in years 1 and 3, respectively. In year 2 the numbers are to be calculated by the short method.

```
TEACHR    3000.          3500.
```

LONG METHOD OF HIRING

The long method of hiring uses an area by area pupil/teacher ratio to project the number of teachers required. This method only has meaning if either PERSIM variable 4, Certification Code, or 3, Subject Area, is selected. The basic calculations employ the following three equations:

(Total number of pupils) * (Classes per pupil) * (Fraction of students taking particular area) = Pupils in class by area

$$\frac{\text{Pupils in class by area}}{\text{Average class size in area}} = \text{Classes in area}$$

$$\frac{\text{Classes in area}}{\text{Average number of classes taught per teacher in area}} = \text{Teachers required in area}$$

It should be noted that reasonably accurate data must be available for each equation if reasonable and consistent results are to be expected. Each variable in the above equations can be changed through specific control cards as explained below. Default values are given whenever the user does not make entries, as explained under DEFAULT DATA. Where applicable, these control cards have two basic options. The option desired is specified on the control cards as follows:

Option	Description
0 or blank	Read data directly from cards into the parameter specified. There are 10 data entries per card. This option requires multiple sequential cards for complete changes of the larger PERSIM variables.
1	Increase one location within the parameter specified. This card requires only two data entries: the location to be changed and the amount of the change.

Other options are peculiar to each type of control card as explained below. Any combination of control cards can be entered for each separate year of the projection. For a given year, the cards are performed in the order they are read in. If multiple changes to the same parameter are to be made during the same year, the sequence of the control cards becomes significant.

LONG METHOD OF HIRING CONTROL CARDS

RTLONG

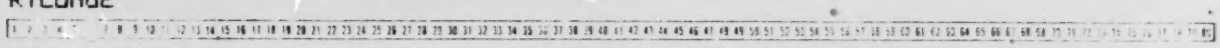
Function: This card selects the long method od calculating hiring requirements starting in a given year. This method remains selected for the following years until subsequently changed. This card is redundant if other long method control cards are employed.

Description:

Card Column	Contents	Explanation
CC1-6	"RTLONG"	
CC7	Year	Year of projection when long method is to begin being used. For default method of hiring, see SHORT METHOD OF HIRING.
CC8-80	Blank	

Example: Use the long method of hiring requirements starting in year two.

RTLONG2



LONG METHOD OF HIRING CONTROL CARDS

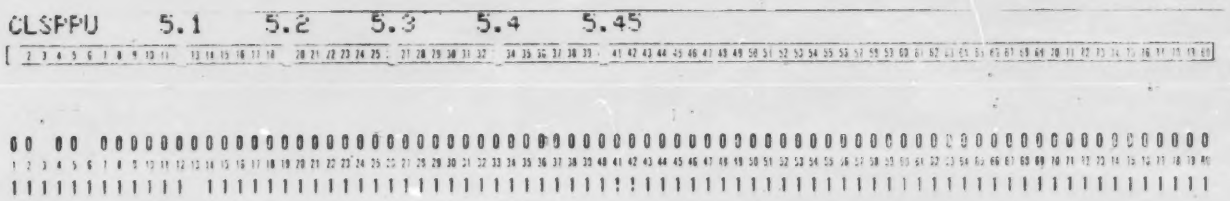
CLSPPU, ECLSPP

Function: These cards define the average number of classes taken by each secondary or elementary pupil in the system. This number should be concordant with the CLSTCH variables explained under that heading, as well as in LONG METHOD OF HIRING.

Description: (2 Control Cards)

Card Column	Contents	Explanation
CC1-6	"CLSPPU"	
CC7-10	Blank	
CC11-17	Year 1 data	Average number of classes taken by secondary students. Use decimal point. See DEFAULT DATA for preprogrammed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	
CC1-6	"ECLSPP"	
CC7-10	Blank	
CC11-17	Year 1 data	Average number of classes taken by elementary students. Use decimal point. See DEFAULT DATA for preprogrammed values.
CC18-24	Year 2 data	
CC25-31	Year 3 data	
CC32-38	Year 4 data	
CC39-45	Year 5 data	
CC46-52	Year 6 data	
CC53-59	Year 7 data	
CC60-66	Year 8 data	
CC67-73	Year 9 data	
CC74-80	Blank	

Example: The average number of classes taken by secondary students is to increase for five years as indicated on the following control card.



LONG METHOD OF HIRING CONTROL CARDS

PUPARA

Function: This card changes the fractional portion of the secondary pupils taking different teaching areas (see PERSIM VARIABLE DESCRIPTIONS, Subject Area and Certification Code). The program automatically selects the PERSIM variable that is to be modified (variable 3 or 4). This data is used in the LONG METHOD OF HIRING equation:

(Total number of pupils - PUPILS)	*	(Classes per pupil - CLSPUP)	*	(Fraction of students taking particular teaching area - PUPARA)	=	(Pupils in class by area - PUPCLS)

PUPARA values, once entered, remain unchanged until subsequently modified by control cards.

There are 5 options available when using the PUPARA control card.

Option	Description
0 or Blank	Replace existing information for pupil distribution with information on this contiguous string of cards. Each card contains 10 entries with the first card commencing where the prior card left off. That is, card 1 enters areas 1 through 10, card 2 enters areas 11 through 20, and so on. Zero entries are not ignored.

1 through 4 modify only selected areas. Since the total of the distribution within a PUPARA must be 1.00, any increase in one area must be accompanied by corresponding decreases in other areas.

1.	Increment one area by the given amount and have the other areas listed evenly absorb the corresponding amount. For example, if 3 other areas are indicated, then the change will be split evenly 3 ways.
2.	Increment one area by the given amount and have the other areas listed absorb the corresponding change on a decreasing basis. The first area will absorb 50%, the second area will absorb 25%, and so on, with each succeeding area absorbing one half of the remaining change. The last entry will absorb all that remains.
3.	Increment one area by the given percentage and have the other areas listed evenly absorb the corresponding amount. This option is the same as option 1 except a percentage instead of an amount is used.

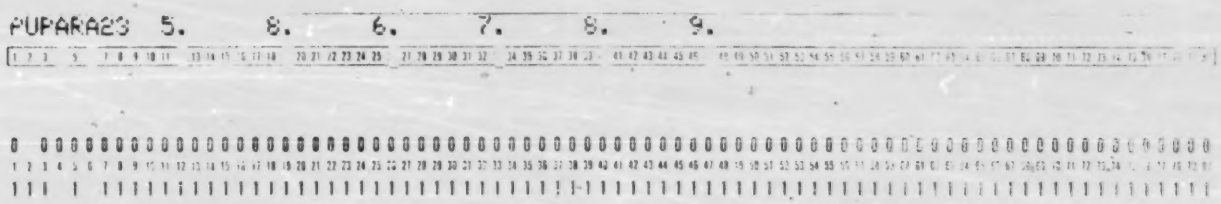
PUPARA, continued

4. Increment one area by the given percentage and have the other areas listed absorb the corresponding change on a decreasing basis. This option is the same as option 2 except a percentage instead of an amount is used.

Description:

Card Column	Contents	
CC1-6	"PUPARA"	
CC7	Year	
CC8	Option	
CC9-10	Blank	
	Option "0" (Include decimal point on all entries below)	Other Options
CC11-17	Data area 1, (or 11 on 2nd card, etc.)	Area to be incremented.
CC18-24	Data area 2	Amount or percentage, as explained under option, to be changed.
CC25-31	Data area 3	1st area to absorb change.
CC32-38	Data area 4	2nd area to absorb change.
CC39-45	Data area 5	3rd area to absorb change.
CC46-52	Data area 6	4th area to absorb change.
CC53-59	Data area 7	5th area to absorb change.
CC60-66	Data area 8	6th area to absorb change.
CC67-73	Data area 9	7th area to absorb change.
CC74-80	Data area 10	8th area to absorb change.

Example: It is desired to increase the percentage of students taking English (area 5) by 8%, allowing the corresponding decrease to be spread evenly over areas 6, 7, 8, and 9. In this case PERSIM variable 3, Subject Area, has been chosen. This card will employ option 3.



LONG METHOD OF HIRING CONTROL CARDS

PUPCLS

Function: This card enters the number of pupils taking classes in the different teaching areas (see PERSIM VARIABLE DESCRIPTIONS, Subject Area and Certification Code). If a "value" is entered using the control card, the program bypasses some of the calculations of the LONG METHOD OF HIRING. The LONG METHOD OF HIRING uses the following equations to find the PUPCLS "value":

PUPCLS "VALUE" = (Total number of pupils) * (Classes per pupil) * (Fraction of students taking a particular area)

Data for this "value" must be entered every year the "value" is to occur, as the program has no memory capability. If Option "0" is employed each card will contain 10 entries with sequential cards commencing where prior cards terminate. That is, if 3 sequential cards are used, the first card modifies areas 1 through 10, the second card modifies areas 11 through 20, and the third card modifies areas 21 through 30.

Description:

Card Column	Contents	Explanation
CC1-6	"PUPCLS"	
CC7	Year	
CC8	Option desired	See explanation under LONG METHOD OF HIRING.
CC9-10	Blank	
	Option "0"	Option "1"
	(Include decimal point on all entries below)..	
CC11-17	Data area 1 (or 11 on 2nd card, 21 on 3rd card, 31 on 4th card)	Area location to be changed.
CC18-24	Data area 2	Increment to existing data value.
CC25-31	Data area 3	Blank
CC32-38	Data area 4	Blank
CC39-45	Data area 5	Blank
CC46-52	Data area 6	Blank
CC53-59	Data area 7	Blank
CC60-66	Data area 8	Blank
CC67-73	Data area 9	Blank
CC74-80	Blank	Blank

LONG METHOD OF HIRING CONTROL CARDS

PUPCLS continued

Example: The number of pupils taking English, area 5, in year 3 is to be decreased by 500. Option "1", as explained under LONG METHOD OF HIRING is employed.

```
PUPCLS31  5.      500.
```

LONG METHOD OF HIRING CONTROL CARDS

CLSSIZ

Function: This card changes the average size of the classes in various teaching areas. It is used in the LONG METHOD OF HIRING equation as follows:

$$\frac{\text{Pupils taking classes in area}}{\text{Average class size (CLSSIZ)}} = \text{Classes taught in area (CLASSS)}$$

These values, once entered, remain until subsequently modified. if Option "0" is employed each card will contain 10 entries with sequential cards commencing where prior cards terminate. That is, if 3 sequential cards are used, the first card modifies areas 1 through 10, the second card modifies areas 11 through 20, and the third card modifies areas 21 through 30.

Description:

Card Column	Contents	Explanation
CC1-6	"CLSSIZ"	
CC7	Year	
CC8	Option desired	See explanation in LONG METHOD OF HIRING.
CC9-10	Blank	
	Option "0"	Option "1"
	(Include decimal point on all entries below.)	
CC11-17	Data area 1 (or 11 on 2nd card, 21 on 3rd card, 31 on 4th card)	Area location to be changed.
CC18-24	Data area 2	Increment to existing data.
CC25-31	Data area 3	Blank
CC32-38	Data area 4	Blank
CC39-45	Data area 5	Blank
CC46-52	Data area 6	Blank
CC53-59	Data area 7	Blank
CC60-66	Data area 8	Blank
CC67-73	Data area 9	Blank
CC74-80	Blank	Blank

Example: The average size of art classes, area 2, (See PERSIM VARIABLE DESCRIPTIONS) in year 2 is 5 less than in year 1. In year 3, the size returns to its former value. Option "1" as explained in LONG METHOD OF HIRING is employed.

```
CLSSIZ21  2.     -5.
CLSSIZ31  2.      5.
```

LONG METHOD OF HIRING CONTROL CARDS

CLASSS

Function: This card changes the number of classes to be taught for one year in a teaching area. The number of classes taught in each area is calculated each year in the LONG METHOD OF HIRING from the following equation:

$$\frac{\text{Average class size in area}}{\text{Pupils in class by area}} = \text{Number of classes taught in area (CLASSS)}$$

If a value is entered by control card for the number of classes taught in an area for a particular year, then the above calculation is bypassed and the number entered by the control card is used instead. Changes by this card must be made every year as there is no carry forward from year to year. If Option "0" is employed each card will contain 10 entries with sequential cards commencing where prior cards terminate. That is, if 3 sequential cards are used, the first card modifies areas 1 through 10, the second card modifies areas 11 through 20, and the third card modifies areas 21 through 30.

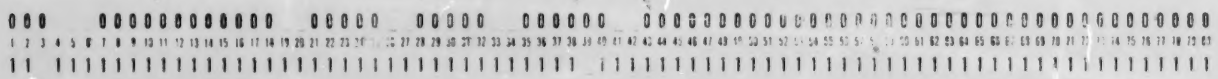
Description:

Card Column	Contents	Explanation
CC1-6	"CLASSS"	
CC7	Year	
CC8	Option desired	See explanation in LONG METHOD OF HIRING.
CC9-10	Blank	
	Option "0"	Option "1"
	(Include decimal point on all entries below).	
CC11-17	Data area 1 (or 11 on 2nd card, 21 on 3rd card, 31 on 4th card)	Area location to be changed.
CC18-24	Data area 2	Increment to existing data.
CC25-31	Data area 3	Blank
CC32-38	Data area 4	Blank
CC39-45	Data area 5	Blank
CC46-52	Data area 6	Blank
CC53-59	Data area 7	Blank
CC60-66	Data area 8	Blank
CC67-73	Data area 9	Blank
CC74-80	Blank	Blank

CLASSS continued

Example: It is desired to set the number of classes to be taught in areas two through six for year 2. Option "0" as explained under LONG METHOD OF HIRING is to be used.

```
CLASSS2          300.    600.    200.    1200.   .25.
```



LONG METHOD OF HIRING CONTROL CARDS

CLSTCH

Function: This card changes the average number of classes taught by the teachers in each teaching area. This value is needed in the following equations from the LONG METHOD OF HIRING.

$$\frac{\text{Classes in area (CLASSS)}}{\text{Average number of classes taught by a teacher in an area (CLSTCH)}} = \text{Teachers required in teaching area (TCHREQ)}$$

These values, once entered, remain until subsequently modified. If Option"0" is employed each card will contain 10 entries with sequential cards commencing where prior cards terminate. That is, if 3 sequential cards are used, the first card modifies areas 1 through 10, the second card modifies areas 11 through 20, and the third card modifies areas 21 through 30.

Description:

Card Column	Contents	Explanation
CC1-6	"CLSTCH"	
CC7	Year	
CC8	Option desired	See explanation in LONG METHOD OF HIRING.
CC9-10	Blank	
	Option "0"	Option "1"
	(Include decimal point on all entries below).	
CC11-17	Data area 1 (or 11 on 2nd card, 21 on 3rd card, 31 on 4th card)	Area location to be changed.
CC18-24	Data area 2	Increment to existing data.
CC25-31	Data area 3	Blank
CC32-38	Data area 4	Blank
CC39-45	Data area 5	Blank
CC46-52	Data area 6	Blank
CC53-59	Data area 7	Blank
CC60-66	Data area 8	Blank
CC67-73	Data area 9	Blank
CC74-80	Blank	Blank

Example: The average number of classes taught by each math teacher, area 11, (see PERSIM VARIABLE DESCRIPTIONS), is decreased by 0.5 starting with projection year 3. Option "1" as explained in LONG METHOD OF HIRING is employed.

```
CLSTCH31  11.    -5.
```

LONG METHOD OF HIRING CONTROL CARD

TCHREQ

Function: This card defines the number of teachers required in various teaching area. It is the result of the LONG METHOD OF HIRING equation as follows:

$$\frac{\text{Classes in area (CLASSS)}}{\text{Average number of classes taught by a teacher in an area (CLSTCH)}} = \text{Teachers required in teaching area (TCHREQ)}$$

If a value is entered by control card for the number of teachers required for a particular teaching area for a particular year, then the above calculation is bypassed and the number entered by the control card is used instead. Changes by this card must be made every year as there is no carry forward from year to year. If Option "0" is employed each card will contain 10 entries with sequential cards commencing where prior cards terminate. That is, if 3 sequential cards are used, the first card modifies areas 1 through 10, the second card modifies areas 11 through 20, and the third card modifies areas 21 through 30.

Description:

Card Column	Contents	Explanation
CC1-6	"TCHREQ"	
CC7	Year	
CC8	Option desired	See explanation in LONG METHOD OF HIRING.
CC9-10	Blank	
	Option "0"	Option "1"
	(Include decimal point on all entries below).	
CC11-17	Data area 1 (or 11 on 2nd card, 21 on 3rd card, 31 on 4th card)	Area location to be changed.
CC18-24	Data area 2	Number of teachers in area.
CC25-31	Data area 3	Blank
CC32-38	Data area 4	Blank
CC39-45	Data area 5	Blank
CC46-52	Data area 6	Blank
CC53-59	Data area 7	Blank
CC60-66	Data area 8	Blank
CC67-73	Data area 9	Blank
CC74-80	Blank	Blank

LONG METHOD OF HIRING CONTROL CARDS

TCHREQ - continued

Example: It is desired to have 65 Math (Area 11) teachers in year 4. The LONG METHOD OF HIRING has been selected. PERSIM variable 3, Subject Area, has been selected.

```
TCHREQ41  11.     65.
```

OLD DISTRIBUTION METHOD OF HIRING

This method hires people in a manner such that the distribution will not change in the next year. That is, the hiring will be such that there will be the same distribution within the selected PERSIM variables as in the prior year. The percentage of teachers within each area of each selected PERSIM variable is maintained by forcing the hiring to fill the differences between those remaining in the system and the required numbers. This method of hiring uses a systemwide pupil/teacher ratio in exactly the same manner as the SHORT METHOD OF HIRING to calculate the number of teachers required in the coming year. That is, the number of teachers required may change, but the percentage of teachers in separate areas by individual PERSIM variable will remain the same. This method does not assure that the description of the teachers within the system will remain unchanged, but that the distribution of teachers within each individual PERSIM variable selected will be the same.

A description of the control card for this method of hiring follows.

OLD DISTRIBUTION METHOD OF HIRING CONTROL CARDS

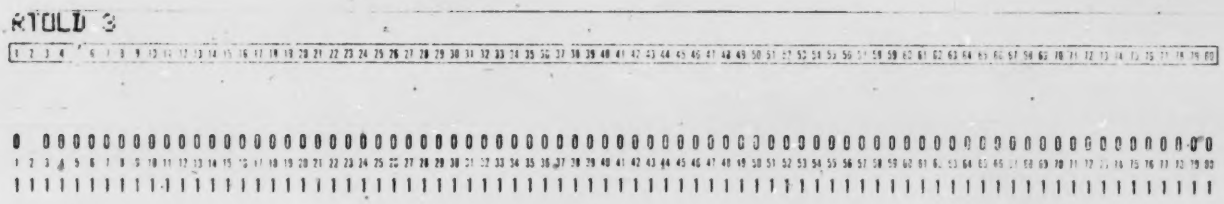
RTOLD

Function: This control card invokes the OLD DISTRIBUTION METHOD OF HIRING starting in the year indicated. This method will continue to be used until subsequently changed.

Description:

Card Column	Contents	Explanation
CC1-6	"RTOLD"	
CC7	Year	Projection year when OLD DISTRIBUTION METHOD is to be used.
CC8-80	Blank	

Example: Use the old distribution method of hiring starting in year 3.



C7

Appendix A

PERSIM VARIABLE DESCRIPTIONS

Variable	Item
1. Race	1. White 2. Black 3. Mexican-American 4. Other
2. Sex	1. Male 2. Female
3. Subject Areas	1. Agriculture 2. Art 3. Business 4. Distributive Education 5. English Language Arts 6. Foreign Languages 7. Health Occupations 8. Health & Physical Education 9. Homemaking 10. Industrial Arts 11. Mathematics 12. Music 13. Science 14. Office Occupations 15. Social Studies 16. Technical Education 17. Trades & Industry 18. Occupational Needs 19. Elementary Education 20. Handicapped Children 21. School Nurse 22. Librarian
4. Certification Area	1. Biology 2. Chemistry 3. Physics 4. Science-General 5. Mathematics 6. Library 7. English 8. Journalism 9. Speech Drama

Appendix A - PERSIM VARIABLE DESCRIPTIONS

4. (Continued)	10.	Agriculture
	11.	Geography
	12.	Government
	13.	History
	14.	Social Studies
	15.	Economics
		Psychology
		Sociology
	16.	Home Economics
	17.	French
	18.	Latin/German
	19.	Spanish
	20.	School Nurse
	21.	Art
	22.	Industrial Arts
	23.	Business
	24.	Health & P.E.
	25.	Music
	26.	Elementary
	27.	Special Education
		Deficient Vision
		Physically Handicapped
		Deficient Hearing
		Retarded
		Speech Correction
		Emotionally Disturbed
	28.	Occupational Programs
		Trades & Industries (Co-op)
		Distributive Education
		Other Occupational Programs
5. Highest Degree (Not presently usable)	1.	Less than 2 years of college
	2.	2 years of college
	3.	3 years of college
	4.	Bachelor's degree
	5.	Master's degree
	6.	Doctoral degree
6. Professional Status	1.	Elementary (raw data 10)
	2.	Senior High School (11)
	3.	Junior High (12)
	4.	Special and Other (other)
7. Professional Status and Termination Code	1.	Elementary Classroom Teacher (raw data 10)
	2.	High School Classroom Teacher (11)
	3.	Junior High Classroom Teacher (12)
	4.	Kindergarten (14)
		Kindegarten Teacher (94)
		Early Childhood Educ. for Handicapped (5252)

7. (Continued)

5.	Librarian	(raw data - 32
6.	School Nurse	(33)
7.	Visiting Teacher	(35)
8.	Itinerant Teacher	(36)
9.	Deficient Vision	(41)
	Visually Handicapped	(4041)
10.	Physically Handicapped	(42)
	Orth Handicap School Room	(4042)
	Orth Handicap at Home	(4142)
	Orth Handicap in Hospital	(4242)
	Vocational Handicapped	(6067)
11.	Deficient Hearing	(43)
	Auditorally Handicapped	(4343)
	Teacher of Pre-School Deaf	(95)
	Teacher of County-Wide School for Deaf	(96)
12.	Retarded	(44)
	Physically Handicap/Mentally Retarded	(4244)
	Minimally Brain-Injured	(4342)
	Mentally Retarded-Educable	(4444)
	Mentally Retarded-Trainable	(4544)
13.	Speech Correction	(45)
	Speech and Hearing	(4545)
14.	Emotionally Disturbed	(47)
	Emotionally Distrubed-Elementary	(4647)
	Emotionally Disturbed-Secondary	(4747)
	Emotionally Disturbed-Hospital	(4847)
	Emotionally Disturbed-Community Center	(4947)
	Emotionally Disturbed-Homebound	(5047)
15.	Trades & Industries (Shop)	(61)
	Trades & Industries (Co-op)	(62)
	Vocational-Industrial	(6062)
	CVAE-Industrial	(6662)
	Industrial Handicapped	(6762)
16.	Agriculture	(63)
	Vocational-Agriculture	(6063)
	CVAE-Agriculture	(6663)
	Agriculture Handicapped	(6763)
17.	Homemaking	(64)
	Homemaking-Useful	(6064)
	Homemaking-Gainful	(6164)
	CVAE-Homemaking	(6664)
	Homemaking Handicapped	(6764)
18.	Distributive Education	(65)
	Vocational-Distributive Ed.	(6065)
	CVAE-Distributive	(6665)
	Distributive Handicapped	(6765)

Appendix A - PERSIM VARIABLE DESCRIPTIONS

7. (Continued)	19.	Miscellaneous Prof. Personnel	(raw data- 87)
	20.	Driver Education	(88)
	21.	Title I-Elem. & Sec. Ed. Act	(99)
	22.	Vocational-Health Occupations	(6068)
		CVAE-Health	(6668)
		Health Occupational-Handicapped	(6768)
	23.	Vocational-Office	6098)
		CVAE-Office	(6698)
		Office Handicapped	(6798)
	24.	Supportive Units	
		S.E.-Visiting Teacher	(5235)
		Educational Diagnostician	(5240)
		Language & Learning Disability	(5251)
		Combination Units	(5147)
	25.	Pregnant Students	(4611)
	26.	Vocational Supervisor	(6069)
		Occupational Orientation	(6091)
	27.	Technical-Electrinics	(6296)
		Technical-Data Processing	(6396)
		TERMINATION CODES	
	28.	Reassigned in DISD	
	29.	Accepted Job in Other Dist.	
	30.	Accepted Job Outside Educ.	
	31.	Quit for Personal Reasons	
	32.	Deceased	
	33.	Reg. or Disability Retirement	
	34.	Leave of Absence	
8. DISD Salary (Not presently usable)		Undefined	
9. Pay Grade, Pay Step, and Termination Code	1.	Pay Grade 1	Pay Step 0
	2.	Pay Grade 1	Pay Step 1
	3.	Pay Grade 1	Pay Step 2
	4.	Pay Grade 1	Pay Step 3
	5.	Pay Grade 1	Pay Step 4
	6.	Pay Grade 1	Pay Step 5
	7.	Pay Grade 1	Pay Step 6
	8.	Pay Grade 1	Pay Step 7
	9.	Pay Grade 1	Pay Step 8
	10.	Pay Grade 1	Pay Step 9
	11.	Pay Grade 1	Pay Step 10
	12.	Pay Grade 2	Pay Step 0
	13.	Pay Grade 2	Pay Step 1
	14.	Pay Grade 2	Pay Step 2

9. (Continued)

15.	Pay Grade 2	Pay Step 3
16.	Pay Grade 2	Pay Step 4
17.	Pay Grade 2	Pay Step 5
18.	Pay Grade 2	Pay Step 6
19.	Pay Grade 2	Pay Step 7
20.	Pay Grade 2	Pay Step 8
21.	Pay Grade 2	Pay Step 9
22.	Pay Grade 2	Pay Step 10
23.	Pay Grade 2	Pay Step 11
24.	Pay Grade 2	Pay Step 12
25.	Pay Grade 3	All Steps

TERMINATION CODE

26. Reassigned in DISD to non-teaching job.
27. Accepted job at another school district
28. Accepted job outside of teaching or education profession
29. Quit for personal or family reasons
30. Deceased
31. Regular or disability retirement
32. Leave of absence

10. Professional Status Without Terminations — Same as variable 7 without items 28 through 34

11. Principal's Rating (Not presently usable)
1. Excellent
2. Good
3. Conditional
4. Unacceptable

12. National Teacher's Exam (Not presently usable.) — Undefined

Appendix A - PERSIM VARIABLE DESCRIPTIONS

13.	Race-Sex Combination	1. White Male 2. White Female 3. Black Male 4. Black Female 5. Mexican-American Male 6. Mexican-American Female 7. Other Male 8. Other Female

Appendix B

DEFAULT VALUES

When no information for a parameter is specified by the user through control cards, the program automatically uses pre-programmed information. The following is a list of these default values:

-- Size of initial starting teacher vector - Uses unadjusted teacher vector from input tape generated by segment 1 of the model.

-- The short method of hiring is automatically selected.

BASINC - Teacher base salary 7,000 all ten years

PUPILS - Number of secondary pupils 80,000 all years

EPUPIL - Number of elementary pupils 80,000 all years

PTRATO - Secondary pupil/teacher ratio 28:1 all years

EPTRAT - Elementary pupil/teacher ratio 27:1 all years

CLSPPU - Classes/secondary pupils 4.458 all years

ECLSPP - Classes/elementary pupils 6.177 all years

CLSSIZ - Class size by subject area

Area	Class Size
1.	28.0
2.	26.5
3.	28.4
4.	22.0
5.	26.7
6.	22.8
7.	28.0
8.	45.0
9.	24.4
10.	24.0
11.	26.8
12.	37.0

Appendix B

DEFAULT VALUES, continued

CLSTCH - Classes per teacher by subject area

Area	Classes
1.	5.00
2.	4.97
3.	4.85
4.	5.12
5.	5.00
6.	5.00
7.	5.00
8.	4.90
9.	4.95
10.	4.90
11.	4.88
12.	4.90
13.	4.85
14.	5.10
15.	4.80
16.	5.00
17.	5.20
18.	5.00
19.	5.00
20.	2.50
21.	5.00
22.	5.00

Appendix B

INDEX - Teacher Pay Grade/Pay Step Indexes

The following will be the same for all years.

Pay Grade 1	Pay Grade 2	Pay Grade 3
Pay Step 0-1.00	Pay Step 0 - 1.10	Grouped together
Pay Step 1-1.04	Pay Step 1 - 1.14	all at - 2.20
Pay Step 2-1.08	Pay Step 2 - 1.18	
Pay Step 3-1.13	Pay Step 3 - 1.23	
Pay Step 4-1.18	Pay Step 4 - 1.28	
Pay Step 5-1.23	Pay Step 5 - 1.33	
Pay Step 6-1.28	Pay Step 6 - 1.38	
Pay Step 7-1.33	Pay Step 7 - 1.43	
Pay Step 8 - 1.38	Pay Step 8 - 1.48	
Pay Step 9-1.44	Pay Step 9 - 1.54	
Pay Step 10-1.50	Pay Step 10 - 1.60	
	Pay Step 11 - 1.66	
	Pay Step 12 - 1.72	

Appendix B

HIRERQ - The distribution for hiring teachers

PERSIM Variable	Area	Value
1	1	.75
	2	.25
	3	.00
	4	.00
2	1	.50
	2	.50
3	1	.25
	2	.25
	3	.25
	4	.24
	All others	.00
4	1	1.00
	All others	.00
5	All zero	
6	All zero	
7	1	1.00
	All others	.00
8	Not presently usable	
9	1	.52
	2-7	.05
	8-11	.04
	12-13	.01
	All others	.00
10	All zero	
11	Not presently usable.	
12	Not presently usable.	
13	1	1.00
	All others	.00

YEAR END DESCRIPTION FOR YEAR 1

PAY GRADE/STEP TERM-CODE VS SUBJECT AREA

	AGRICULTURE		ART		BUSINESS		DISTRIB. ED.		ENG/LANG ART		FOREIGN LANG		HEALTH OCCUP		HEALTH P.E.	
	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST
1 PAY GR1 ST 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 PAY GR1 ST 1	0	0	0	0	1	7280	0	0	0	0	0	0	0	0	0	0
3 PAY GR1 ST 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 PAY GR1 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 PAY GR1 ST 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 PAY GR1 ST 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 PAY GR1 ST 6	0	0	0	0	0	0	0	0	1	8960	0	0	0	0	0	0
8 PAY GR1 ST 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 PAY GR1 ST 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 PAY GR1 ST 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 PAY GR1 ST10	0	0	0	0	0	0	0	0	1	10500	0	0	0	0	1	10500
12 PAY GR2 ST 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 PAY GR2 ST 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 PAY GR2 ST 2	0	0	0	0	0	0	0	0	1	8260	0	0	0	0	0	0
15 PAY GR2 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 PAY GR2 ST 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 PAY GR2 ST 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 PAY GR2 ST 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 PAY GR2 ST 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 PAY GR2 ST 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 PAY GR2 ST 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 PAY GR2 ST10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 PAY GR2 ST11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 PAY GR2 ST12	0	0	0	0	0	0	0	0	2	24080	0	0	0	0	0	0
25 ALL PHDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 REASSGN-DISD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 JOB-OTH DIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 JOB OUTSD ED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 PERS. REASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 DECEASED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 RETIREMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32 LEAVE OF ABS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 SUB-TOTAL	0	0	0	0	1	7280	0	0	5	51800	0	0	0	0	1	10500

Appendix C

YEAR END DESCRIPTION FOR YEAR 1

PAY GRADE/STEP TERM-CODE VS SUBJECT AREA

	HOMEMAKING		INDUST. ARTS		MATHEMATICS		MUSIC		SCIENCE		OFFICE OCCUP		SOC. STUDIES		TECHNICAL ED	
	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST
1 Pay GR1 ST A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 Pay GR1 ST 1	0	0	0	0	0	0	0	0	0	0	0	0	1	7280	0	0
3 Pay GR1 ST 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Pay GR1 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Pay GR1 ST 4	0	0	0	0	0	0	0	0	1	8260	0	0	0	0	0	0
6 Pay GR1 ST 5	0	0	0	0	1	8610	0	0	0	0	0	0	2	17220	0	0
7 Pay GR1 ST 6	2	17920	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 Pay GR1 ST 7	0	0	0	0	2	18620	0	0	0	0	0	0	0	0	0	0
9 Pay GR1 ST 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Pay GR1 ST 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 Pay GR1 ST10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Pay GR2 ST 0	0	0	0	0	0	0	0	0	0	0	0	0	2	21000	0	0
13 Pay GR2 ST 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 Pay GR2 ST 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Pay GR2 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Pay GR2 ST 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 Pay GR2 ST 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 Pay GR2 ST 6	0	0	1	9660	0	0	0	0	0	0	0	0	0	0	0	0
19 Pay GR2 ST 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Pay GR2 ST 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 Pay GR2 ST 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 Pay GR2 ST10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 Pay GR2 ST11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Pay GR2 ST12	0	0	0	0	1	12040	0	0	0	0	0	0	0	0	0	0
25 ALL PHDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 REASSGN-DIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 JOH-OTH DIST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 JOB OUTSD ED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 PERS. REASON	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 DECEASED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 RETIREMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32 LEAVE OF ABS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 SUB-TOTAL	3	17920	1	9660	4	39270	0	0	1	8260	0	0	5	45500	0	0

Appendix C

YEAR END DESCRIPTION FOR YEAR 1

PAY GRADE/STEP TERM-CODE VS SUBJECT AREA

	TRADES INDUS		OCCUPA-L NDS		ELEMENTARY		HANDICAPPED		NURSE		LIBRARIAN		SUB-TOTAL	
	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST	COUNT	COST
1 PAY GR1 ST 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 PAY GR1 ST 1	0	0	0	0	2	15560	0	0	0	0	0	0	4	29120
3 PAY GR1 ST 2	0	0	0	0	4	30240	0	0	1	7560	0	0	5	37800
4 PAY GR1 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 PAY GR1 ST 4	0	0	0	0	3	24780	0	0	0	0	0	0	4	33040
6 PAY GR1 ST 5	0	0	0	0	1	8610	1	8610	1	8610	0	0	6	51660
7 PAY GR1 ST 6	0	0	0	0	2	17920	0	0	0	0	1	8940	6	53760
8 PAY GR1 ST 7	0	0	0	0	0	0	0	0	0	0	0	0	2	18620
9 PAY GR1 ST 8	0	0	0	0	4	38440	0	0	2	19120	0	0	6	57960
10 PAY GR1 ST 9	0	0	0	0	1	10080	0	0	0	0	0	0	1	10080
11 PAY GR1 ST10	1	10500	0	0	9	94500	1	10500	0	0	0	0	15	157500
12 PAY GR2 ST 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 PAY GR2 ST 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 PAY GR2 ST 2	0	0	0	0	0	0	0	0	0	0	0	0	1	8260
15 PAY GR2 ST 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 PAY GR2 ST 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17 PAY GR2 ST 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 PAY GR2 ST 6	0	0	0	0	0	0	0	0	0	0	0	0	1	9660
19 PAY GR2 ST 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 PAY GR2 ST 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 PAY GR2 ST 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 PAY GR2 ST10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 PAY GR2 ST11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 PAY GR2 ST12	0	0	0	0	2	24080	1	12040	0	0	1	12040	7	84280
25 ALL PHDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2A REASSGN-DISC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 JOB-OTH DIST	0	0	0	0	1	0	0	0	0	0	0	0	1	0
28 JOB OUTSD ED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 PERS. REASON	0	0	0	0	3	0	0	0	0	0	0	0	4	0
30 DECEASED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 RETIREMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32 LEAVE OF ABS	0	0	0	0	2	0	0	0	0	0	0	0	2	0
33 SUB-TOTAL	1	10500	0	0	34	24 410	3	31150	4	35490	2	21000	65	551740